Autonomous ESP Learning of Prospective Teachers of Mathematics

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Abstract: The paper deals with theoretical substantiation and construction of the methodological system of autonomous learning of the course "English for Specific Purposes (ESP)" for prospective teachers of Mathematics. The purpose of the study is to prove theoretically the methodological system of autonomous ESP learning for prospective teachers of Mathematics and to test empirically the current students' level of autonomous learning competence. The main components of the methodological system are observed, among them: target component (social demand, requirements, goals, and objectives); methodological component (approaches and principles); procedure component (content and technologies); assessment component (control and results). The main features such as functionality, complexity, openness and conceptual positions of the methodological system are described in the paper. It is said that the designed methodological system of autonomous learning of ESP of prospective teachers of Mathematics can be implemented in the educational process effectively in the presence of grounded pedagogical conditions, among them: training of students' autonomy, pedagogical support, and effective learning environment. The analysis of the study results reveals that during the initial phase of the implementation of autonomous ESP learning, the students have a moderate level of autonomous learning competence and it needs improvement in the process of implementation of the developed system.

Keywords: *methodological system; autonomous learning; English for specific purposes; prospective teachers of Mathematics; level of autonomous ESP learning competence.*

1. Introduction

Autonomous learning is a relevant issue constituting a significant part of modern research. It is a student-centered learning vision that points out the effectiveness of educational environment. In the process of autonomous learning students assume responsibility for their own learning by undertaking their own learning plans according to their personal needs and aims.

Autonomous learning is derived from the idea that if learners are engaged in making decision processes regarding their own language skills, "they are likely to be more enthusiastic about learning" (Littlejohn, 1985: 258). The process of autonomous learning is more focused and purposeful for students (Little, 1991; Dam, 1995; Chan, 2003). Autonomous students take responsibility for determining the aims, content, rhythm, method, and techniques of their learning, monitoring the progress and evaluating outcomes of the learning (Little, 2000: 69).

However, until now nearly all studies in the area of autonomous learning are based on the following hypotheses: the nature and components of autonomy, the opportunity of promoting autonomy among students and the success of some approaches to encouraging their self-confidence and developing their autonomy in the process of a foreign language learning (Benson, 2001: 183).

Fostering autonomous learning relates to boosting students "to set the goals, to determine the contents and progressions, to choose methods and techniques to be used, to monitor the procedures of obtaining and evaluating what has been acquired" (Holec, 1981: 3). Thus, autonomous learning relies on the personal development, making decisions independently and critical thinking.

Through a focus on learner reflection and taking charge of individual learning process, autonomous learning has become a central research issue in the recent history of foreign language learning. From our point of view, the justification and implementation of autonomous ESP learning in the educational process of prospective teachers of Mathematics will help to develop students' foreign language competence.

2. Problem Statement

The main difficulty of fulfilment of autonomous learning in the process of foreign language acquisition is elucidated in many scientific researches (Holec, 1981; Dickinson, 1987; Little, 1991; Dam, 1995;

Littlewood, 1996, 1997; Nunan, 1997; Cotterall, 1999; Smith, 2000; Scharle & Szabo, 2000; Chan, 2001, 2003; Palfreyman & Smith, 2003; Castle, 2006; Barfield & Brown, 2007; Benson, 2007; Little, 2007; Lamb & Reinders, 2007; Burkert & Schwienhorst, 2008; Egel, 2009; Reinders, 2010; Yan, 2010).

Currently, several methodological models of autonomous English learning are developed. The models describe the ways of implementing of autonomous language learning in the educational process (Cotterall, 1995; Benson, 2003; Nunan, 2003; Reinders, 2010).

An analysis of scientific papers reveals that the methodology of autonomous ESP learning for prospective teachers of Mathematics remains out of focus.

3. Research Aims

The purpose of the research is to prove theoretically the methodological system of autonomous ESP learning for prospective teachers of Mathematics and to test empirically the current students' level of autonomous learning competence at the initial stage of implementation of autonomous ESP learning in the educational process with the aim of taking into consideration the statistical results (the exact level of students' autonomous learning competence) for developing strategies and learning materials for students in the autonomous ESP learning realization.

4. Design and Methods

4.1. Methodology

The methodological system of autonomous ESP learning of prospective teachers of Mathematics is determined as a functional, complex, and open system of education, that: includes approaches, aims and objectives, content, principles, technologies (methods, means, techniques and organizational forms). It is focused on the personality of each student; provides contact and distant co-operation of a teacher and students; assists active organization of educational process and connection between education and a future profession.

On the whole, the *features* referring to the methodological system of autonomous ESP learning of prospective teachers of Mathematics are as follows:

1. *Functionality*. It is the ability to implement the system in the educational process depending on the aim. Thus, the function of the educational system is learning a foreign language as a means of communication. The nature of communication (choice of its strategy and

tactics) is determined by the aim of the course, which is set by social requires of the society.

2. *Complexity.* The system consists of many components (subsystems), which, in the process of learning, interrelate with each other and with an environment as integral units which are in certain hierarchical dependence.

3. *Openness.* Constantly evolving, the system falls under the influence of the environment and is ready to include new components in its structure, the appearance of which is predefined by the achievements of methodology and other courses (Nikolaeva, 2013: 80).

Being based largely on the system approach, general structure of the methodological system of autonomous ESP learning of prospective teachers of Mathematics is viewed by following components (subsystems): *target component* (social demand, requirements, goals and objectives); *methodological component* (approaches and principles); *procedure component* (content and technologies); *assessment component* (control and results).

The *conceptual positions* of the methodological system of autonomous ESP learning of prospective teachers of Mathematics consider: peculiarities of future career; external and internal factors of influence on the student personality (individual learning style, developing skills, setting the view of the world, development of cognitive motivation, identifying requirements in order to be autonomous (setting goals, selection of educational materials and strategies, control and evaluation of individual results of studies, solving problem-based tasks, etc.)); English communicative competence (knowledge, ability to communicate with specialists from different countries, carry out professional activities in the conditions of the foreign professionally-oriented environment); support the proper level of autonomous ESP learning competence in the English lifelong learning.

Target component: social demand, requirements, goals and objectives

Determining the social demand of the society on the preparation of highly skilled teachers of Mathematics we turn to conceptual European principles of language education in the process of preparation of bachelors, and also public policy in relation to support the development and use of English in higher education in Ukraine.

As noted in the typical English language program for professional communication (Bakayeva et al., 2005), considering the fact that Ukraine declared about the intention to become an equal partner within the framework of the Bologna Process, it is expected, that Ukrainian higher

educational institutions will carry out an educational process in accordance with the European standards of language competence. Taking into account the results of national reform of teaching English in comprehensive schools and international practice of language learning in higher educational institutions, the ESP program states, that the minimally acceptable level of language competence for a Bachelor is B2 (Independent user) according to CEFR for Languages (Council of Europe, 2001). Criteria for the level B2 of the typical program of ESP are based on: requirements of the education qualifying descriptions of graduating students, ratified by the Ministry of Education and Science in Ukraine; specific job descriptions worked out and ratified by enterprises, organizations, and institutes; the results of pre-project study of ESP teaching (Bakayeva et al., 2005) and interviewing teaching staff and students of higher educational institutions.

The initial level of language proficiency of B2 for bachelors should be estimated at the final qualifying examination at the end of the course of ESP. The English professionally-oriented communicative competence of graduating students should be checked up in accordance with the standards of the achievements based on the standards of higher education with references to the descriptors of level B2 in CEFR (Council of Europe, 2001).

To receive the Bachelor degree students should communicate English in a professional field and they have to know how and be able:

- to discuss educational and specific issues in order to reach understanding with an interlocutor;

- to prepare public speeches on great varieties of special tasks, applying corresponding means of verbal communication and proper forms of conducting discussions and debates;

- to search new text, graphic, audio and video information on the basis of English using corresponding searching methods and terminology;

- to analyse English sources of information in order to receive data which is necessary for implementing professional tasks and making decisions;

- to write professional texts and documents in English on a number of issues of the professional field;

- to write business and professional letters, demonstrating cross-cultural understanding and previous knowledge in a particular professional context;

- to translate English professional texts into the native language, using bilingual terminological dictionaries, electronic dictionaries and translation software (Bakayeva et al., 2005: 3).

The primary and eventual goal of the course is to master English as a means of formation and formulation ideas in the field of professional activities. The professionally-oriented communication means not only speaking English fluently but also obtaining knowledge, norms, rules of behaviour in the community or organization and developing skills of autonomous learning.

In the process of autonomous learning of English professionally-oriented communication different *objectives* (practical, educational, developmental, and cultural), which are determined by the professional communicative and cognitive needs of prospective teachers of Mathematics, are considered:

- formation and development of the English professionally-oriented communicative competence in listening, speaking, reading, and translation at the B2 language level;

- raising cultural awareness, expansion of linguistic ranges of interests; understanding the essence of the language phenomena in the perception of reality of prospective teachers of Mathematics;

- development of English self-study skills; development of motivation to the further mastering of a foreign language; development of speech and communicative skills of students;

- training the system of moral values, evaluative and emotive attitude toward the world, valid and positive attitude toward people, whose language of that is being studied, their culture and language; understanding the importance of learning English and necessity to use it.

During the achievement of setting goals and implementation of objectives, in particular, it is needed to take into account a number of factors among which:

- *general factors*: role of the linguistic environment; quality of educational materials; the role of the mother (first) tongue; internal processing of information;

- *individual factors*: age; motivation and attitude; capabilities and intellect; individual learning style.

Consequently, in accordance with the goals and set objectives, the autonomous ESP learning of prospective teachers of Mathematics is expected:

- to use linguistic materials (sounds, words, grammatical structures etc.) in the communicative situations;

- to develop the professionally-oriented skills and abilities that are necessary for the achievement of the high efficiency of autonomous learning by means of mastering subject content (declarative knowledge) on the basis of reflexive use of knowledge.

The prospective teachers of Mathematics should know how to: determine the necessities; set aims; choose educational strategies; use learning materials; control and estimate individual results of learning of English professionally-oriented communication.

Methodological component: approaches and principles

The complementary *approaches* as a methodological basis for the autonomous ESP learning of prospective teachers of Mathematics are considered on several levels:

- *the philosophical level* is represented by the humanistic approach;
- *the general scientific level* is represented by the systematic approach;
- *the methodological level* is represented by the personally-oriented, competency-based approaches as well as communicative, competent, contextual, reflexive, professionally oriented, productive, and technological approaches.

From the standpoint of Psychology, the integrative approach is distinguished. Due to the object and the methods of study, the action-oriented and cognitive approaches are pointed out.

Based on the analysis of scientific and methodological researches N. Halskova, N. Hez (2006), S. Nikolaeva (2018), Nikolaeva et al. (2019), grounded set goals, objectives and defined approaches of methodological system of autonomous ESP learning of prospective teachers of Mathematics, three groups of principles are defined: general didactic principles, psychological principles, and methodological principles.

The general didactic principles of autonomous learning of ESP of prospective teachers of Mathematics are: person-oriented learning direction; consciousness; clearness; selectivity; active creative activities; professional orientation in learning a foreign language; the focus of study on the formation of students' autonomous ESP learning competence.

The psychological principles, which are implemented in the methodological system of autonomous learning of ESP of prospective teachers of Mathematics (taking into account the individual psychological characteristics of a student), include motivation and individualization.

The methodological principles of the system being developed include: communicative professional orientation of training; learning communication in a socially and professionally oriented context; integrated learning of all types of communication; cross-curricular integration; problem and professionally oriented tasks.

Procedure component: content and technologies

A distinctive feature of autonomous ESP learning of prospective teachers of Mathematics is that the course of study is developed on the basis of specific professionally significant goals and objectives of students, which is expressed in the appropriate methodology of selection and organization of thematic content, as well as the development of certain professionally oriented skills. The content *specificity* of autonomous ESP learning of prospective teachers of Mathematics is characterized by the following features:

1) compliance with learning goals and objectives;

2) use of students' basic knowledge of general English as a basis for mastering their professionally oriented knowledge and English communication skills;

3) focus on a specific professional field, namely Education / Pedagogy, and specialty – Mathematics. It should be taken into consideration the appropriate lexical content and special format of oral and written tasks on specialty, as well as those skills and abilities that are specific for the teachers of Mathematics;

4) dynamics of the learning process depending on educational conditions.

The *content* of autonomous ESP learning of prospective teachers of Mathematics consists of the following components, which are closely interrelated:

Subject aspect:

1. Spheres of professionally-oriented communication, situations; topics, texts, and problems; communicative goals and intentions.

2. Linguocultural materials (country and linguistic knowledge), social situations.

3. Professionally oriented language materials.

4. Knowledge of educational autonomy, individual learning style, learning strategies.

Procedural aspect:

1. Proficiency in English oral and written communication.

2. Skills in managing linguistic and socio-cultural materials, operation with social situations.

3. Skills in operating professionally-oriented language materials.

4. Skills of autonomous learning and using different types of learning strategies.

All of these components of the content of the methodological system of autonomous learning of ESP of prospective teachers of Mathematics are closely interrelated with each other, which needs to be taken into account while selecting the content and organization of the educational process.

The selection of ESP content can be presented as follows:

1. Form and select thematic sections of the course.

2. Highlight problems for discussion or communicative situation within the chosen topic.

3. Create a vocabulary list of topics based on the selected situations and problems.

4. Allocate language and speech material for active and passive learning;

5. Arrange the topics and sections in a logical sequence (if necessary, organize and specify them).

6. Specify the content and principles of the selection of linguistic, socio-cultural and pragmatic material.

7. Select learning literature and texts, sources of visual and informational support (pictorial and pictorial-verbal supports, audio and video materials, Internet resources, etc.) of the ESP course for prospective teachers of Mathematics.

System-forming factors of procedure component are:

- a positive learning environment with subject-subject interaction in the process of acquisition of language skills;

- providing conditions for the realization of students' interaction within their autonomous learning activities, which is the main reflection of the educational process;

- creation of communicative situations aimed at the professional activities with the purpose of developing, stimulating and motivating all the participants of the interaction.

The *tactical educational technologies* (methods, techniques, forms, and means) make a great contribution to the effective implementation of the methodological system of autonomous ESP learning of prospective teachers of Mathematics. The selection criteria for tactical educational technologies are:

- the specificity of the English professionally-oriented learning materials;

- general and individual factors of influence;

- learning material and technical conditions of the study.

Therefore, the tactical educational technologies are oriented on the students' personalities, their active participation in self-development, acquisition of qualitative knowledge, professionally-oriented skills and abilities, creation of active, personal-developmental and professionally-oriented environment and English professionally-oriented communication of prospective teachers of Mathematics.

Assessment component: control and results

Monitoring and evaluation of learning outcomes, as well as their correction, is an important component of autonomous ESP learning of prospective teachers of Mathematics. The purpose of learning assessment is to establish the relevance of the learning outcomes and its quality to the assigned learning objectives.

Specificity of control in the conditions of autonomous ESP learning of prospective teachers of Mathematics is as follows: increasing attention to the personality of each student, his / her individual needs, interests and problems, individual learning style; taking into account professionally-oriented goals and objectives of English professional communication; consideration of student self-control results.

Thus, control reflects not only the students' ESP proficiency but the effectiveness of the course, which, in case of low-level, indicates possible mistakes, such as overestimation of goals; misinterpretation of the initial level of command of a foreign language; improper learning methods.

The main characteristics of control in the autonomous ESP learning of prospective teachers of Mathematics are:

- *constructiveness*, when control focuses not on weaknesses, but on achievements;

- *reliability*, control should be consistent in the same conditions, and with the same return of students give fairly close results;

- *validity*, suitability of control tasks for assessing the formation of particular skills;

- *practicality* of control is achieved by the rational time spent on conducting, preparing and checking;

- *accountability* involves providing information to students;

The objects of control in the process of autonomous ESP learning of prospective teachers of Mathematics are knowledge, skills, and abilities. Among them are:

- English oral and written communication abilities;

- skills in managing linguistic and socio-cultural material;

- abilities to engage in communicative relationships, navigate social situations;
- skills in operating professionally-oriented language material;
- autonomous learning skills;
- skills in using different types of learning strategies.

In order to evaluate the results of autonomous ESP learning of prospective teachers of Mathematics objectively, it is necessary, *firstly*, to select and substantiate the criteria and performance indicators of autonomous ESP learning, *secondly*, to determine the level of proficiency of students in English professionally-oriented communication, and, *thirdly*, to determine pedagogical conditions for effective implementation of autonomous ESP learning of prospective teachers of Mathematics.

In accordance with requirements, goals, objectives, approaches, principles, subject and procedural aspects of the content, *the outcomes* of autonomous ESP learning of prospective teachers of Mathematics are determined as a high level of knowledge, skills and abilities of English professionally-oriented communication and students' autonomous ESP learning competence.

The designed methodological system can be implemented in the educational process in the presence of a certain set of *pedagogical conditions*:

1. Students' training for *the formation of autonomous ESP learning competence*, which includes: diagnostics of students' level of autonomous ESP learning competence, determination of the individual learning style, appropriate learning strategies and methods of study, motives for learning, level of foreign language communicative competence; correcting and training the skills of autonomous learning activities and expanding the repertoire of learning strategies; developing students' sense of responsibility, ability to self-esteem and self-control, developing skills to organize the work in the educational process as a whole.

2. *Pedagogical support*, which involves subject-subject interaction between a teacher and a student, which is aimed at the achievement of educational goals and the outcomes.

3. Creating *an effective learning environment* that promotes a student's self-determination, self-realization, and self-development and includes material, methodological and technical support of the realisation of autonomous ESP learning of prospective teachers of Mathematics.

Consequently, a high level of proficiency in autonomous ESP learning of prospective teachers of Mathematics can be achieved if the grounded pedagogical conditions are provided.

4.2. Method

At the initial stage of the fulfilment of the developed methodological system of autonomous ESP learning of prospective teachers of Mathematics in the educational process, it is needed to collect and analyse information about the current students' autonomous learning competence. While these issues of autonomous ESP learning competence and students' readiness for learning autonomy have been analysed in the context of different countries (Tarhan & Erözden, 2008; Xu, 2009; Balçıkanlı, 2010; Hussein & Haron, 2012; Hoxha & Tafani, 2015; Khalymon & Shevchenko, 2017), the level of autonomous English learning competence of prospective Mathematics teachers remains out of focus.

4.2.1. Participants

For the purpose of examination the level of autonomous ESP learning competence of prospective teachers of Mathematics, we have carried out a survey among the students who are doing the course of ESP as the second language at the Department of Mathematics, Physics, and Technology of Vinnytsia Mykhailo Kotsiubynskyi State Pedagogical University while majoring in Mathematics. The questionnaire was completed on condition of anonymity in 2019 by 50 respondents studying in their 1st and 2nd years (23 and 27 students respectively). The questionnaire was held in the classroom under teachers' supervision. The respondents spent about 25 minutes answering the questions.

4.2.2. Instruments

The study is based on quantitative research. The questionnaire "English Students' Autonomy Competence" (Xu, 2009) was the main research tool aimed to find out the level of students' competence in autonomous learning. The survey was specifically designed to assess language learners' skills and abilities to involve in autonomous learning by mastering the degree to which the students are able to conduct autonomous language learning in such specific areas as beliefs in autonomous language learning, determining language learning objectives, implementing appropriate language learning strategies, monitoring the process of autonomous language learning, and evaluating the efficacy of autonomous language learning. According to Xu (2009), the homogeneity and validity of the questionnaire has been supported. Some items in the survey form have been modified to make them closer to the actuality of the Ukrainian higher education environment.

The questionnaire consists of 26 items and they are divided into five types: items 1-4 relates to students' beliefs in autonomous learning; items 5-10 – determining language learning objectives; items 11-15 – implementing appropriate language learning strategies; items 16-21 – monitoring the process of autonomous language learning; items 22-26 – evaluating the efficacy of autonomous language learning.

Likert Scale is used to collect the additional data by getting people's reactions to the statements. The learners were asked to rate how much they agreed with each statement by making a tick next to the number which means the followings: 5 – means completely true (strongly agree); 4 – means usually true (agree); 3 – means sometimes true (uncertain); 2 – means not usually true (disagree); 1 – means never true (strongly disagree). The 'weights' are interpreted as follows: 5 means that the level of learner autonomy competence is very high, 4 – means that the level of learner autonomy competence is high, 3 – means that the level of learner autonomy competence is moderate, 2 – means that the level of learner autonomy competence is low, 1 – means that the level of learner autonomy competence is very low. Consequently, the evaluation criteria of the questionnaire are as follows: 5.00-4.51 means that the level of learner autonomy competence is very high, 4.50-3.51 – means that the level of learner autonomy competence is high, 3.50-2.51 – means that the level of learner autonomy competence is moderate, 2.50-1.51 – means that the level of learner autonomy competence is low, 1.50-1.00 – means that the level of learner autonomy competence is very low.

5. Results and Discussions

The survey response data were tabulated using SPSS. To find out the general level of autonomous ESP learning competence of prospective teachers of Mathematics, the results of the 26-item questionnaire were analyzed to learn mean score and standard deviation (columns 'M' and 'SD' in the table). In our study the reliability coefficient (Cronbach Alpha) value for the questionnaire "English Students' Autonomy Competence" was calculated to estimate the internal consistency. It was found to be quite high: 0.92.

Table 1 shows the results of the statistical analysis of the five examined categories which demonstrates that the mean value for the questionnaire is 2.85 (SD = 0.76). In accordance with the criteria above mentioned, this indicates that on the whole, the level of prospective

teachers' autonomous ESP learning competence is moderate. The data on the categories do not vary substantially.

Table 1. Average mean of all categories and level of learner autonomy competence

№	Category	N	Mean	SD	Level of autonomous ESP learning competence
1.	Beliefs in autonomous learning	50	2.85	0.88	moderate
2.	Determining language learning objectives	50	2.94	0.79	moderate
3.	Implementing appropriate language learning strategies	50	2.75	0.69	moderate
4.	Monitoring the process of autonomous learning	50	2.79	0.71	moderate
5.	Evaluating the efficacy of autonomous language learning	50	2.80	0.74	moderate
	Average		2.85	0.76	moderate

As demonstrated in Table 1, the mean scores of all categories were at the below part of the moderate level. Among them, the mean value of the students' determining language learning objectives had the highest meaning (Mean = 2.94). The mean value of the students' competence in implementing appropriate language learning strategies had the lowest meaning (Mean = 2.75).

As it is clear from Table 1, most values of standard deviation lie in the range 0.69-0.88. It signifies that the data points tend to be close to the mean of the set, i.e. the answers are more or less homogeneous. The lowest value of standard deviation (SD = 0.69) is found in the category having the lowest mean value – implementing appropriate language learning strategies. That seems to be one more proof that this category of autonomous ESP learning competence is not so well developed in most students and should be enhanced.

Evidence-based, we have found out that the overall level of students' autonomous ESP learning competence is moderate. The average data of the responses help to realise that students have rather indefinite beliefs and objectives of autonomous learning; uncertain skills according to implementing strategies and monitoring the learning process; weak awareness about evaluating the efficacy of autonomous language learning. The results show that students are still dependent on their teachers and need

some guidance to help them become more confident learners, capable to learn ESP autonomously.

The findings of this study go in line with the results reported by researchers from other countries (Tarhan & Erözden, 2008; Xu, 2009; Balçıkanlı, 2010; Hussein & Haron, 2012; Hoxha & Tafani, 2015; Khalymon & Shevchenko, 2017): prospective teachers view autonomous ESP learning competence generally positively, though they have certain difficulties being autonomous learners. That is why the implementation of the developed methodological system of autonomous ESP learning of prospective teachers of Mathematics can help to solve the existing problem.

As the size of the sample is rather small, the survey results cannot be generalized as the sample (n=50) selected cannot exemplify the entire population at large. Rather, this study should be considered as an exploratory investigation that has the goal of identifying possible issues and trends for further research.

6. Conclusions

Thus, the constructed methodological system of autonomous ESP learning of prospective teachers of Mathematics is a complex, multileveled, dynamic system, which includes interrelated components, that gives an opportunity to realize a goal-oriented process of autonomous ESP learning of prospective teachers of Mathematics. The main features of the designed system are functionality, complexity, and openness.

The performance of the methodological system is provided by the integration of its components: the target component (social demand, requirements, goals, and objectives); methodological component (approaches and principles); the procedure component (content and technologies); the assessment component (control and results).

The effective implementation of the methodological system of autonomous ESP learning of prospective teachers of Mathematics in the educational process is possible if certain pedagogical conditions (training of students' autonomy, pedagogical support, and effective learning environment) are followed.

The survey results demonstrate that prospective teachers of Mathematics have a moderate level of autonomous ESP learning competence and it should be improved in the process of the developed system implementation.

This study is neither comprehensive nor extensive. There are many more aspects of the study yet to be learned and detailed analysis of the item

results of each category should be performed. The outcomes of the research need to be considered in the process of realization of the methodological system of autonomous ESP learning of prospective teachers of Mathematics and it is important to continue to carry out comparative analysis of the results of the developed system implementation at the final stage of experimental learning.

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